Figure 32: Schematic diagram illustrating system for detecting a target DNA in a four-element array on a substrate using nanoparticle-oligonucleotide conjugates and amplification with silver staining.

Figure 33: Images obtained with a flatbed scanner of 7 mm x 13 mm oligonucleotide-functionalized float glass slides. (A) Slide before hybridization of DNA target and gold nanoparticle-oligonucleotide indicator conjugate. (B) Slide A after hybridization of 10 nM target DNA and 5 nM nanoparticle-oligonucleotide indicator conjugate. A pink color was imparted by attached, red 13 nm diameter gold nanoparticles. (C) Slide B after exposure to silver amplification solution for 5 minutes. (D) Same as (A). (E) Slide D after hybridization of 100 pM target and 5 nM nanoparticle-oligonucleotide indicator conjugate. The absorbance of the nanoparticle layer was too low to be observed with the naked eye or flatbed scanner. (F) Slide E after exposure to silver amplification solution for 5 minutes. Note that slide F is much lighter than slide C, indicating lower target concentration. (G) Control slide, exposed to 5 nM nanoparticle-oligonucleotide indicator conjugate and exposed to silver amplification solution for 5 minutes. No darkening of the slide was observed.

Figure 34: Graph of greyscale (optical density) of oligonucleotide-functionalized glass surface exposed to varying concentrations of target DNA, followed by 5 nM gold of nanoparticle-oligonucleotide indicator conjugates and silver amplification for 5 minutes.

Figures 35A-B: Graphs of percent hybridized label versus temperature showing dissociation of fluorophore-labeled (Figure 35A) and nanoparticle-labeled (Figure 35B) targets from an oligonucleotide-functionalized glass surface. Measurements were made by measuring fluorescence (Figure 35A) or absorbance (Figure 35B) of dissociated label in the solution above the glass surface. The lines labeled "b" show the dissociation curves for perfectly matched oligonucleotides on the glass, and the lines labeled "r"show curves for mismatched oligonucleotides (a one-base mismatch) on the glass. Vertical lines in the graphs illustrate the fraction of target dissociated at a given temperature (halfway between the melting temperatures T_m of each curve) for each measurement, and the expected selectivity of sequence identification for fluorophore- and nanoparticle-based gene chips.